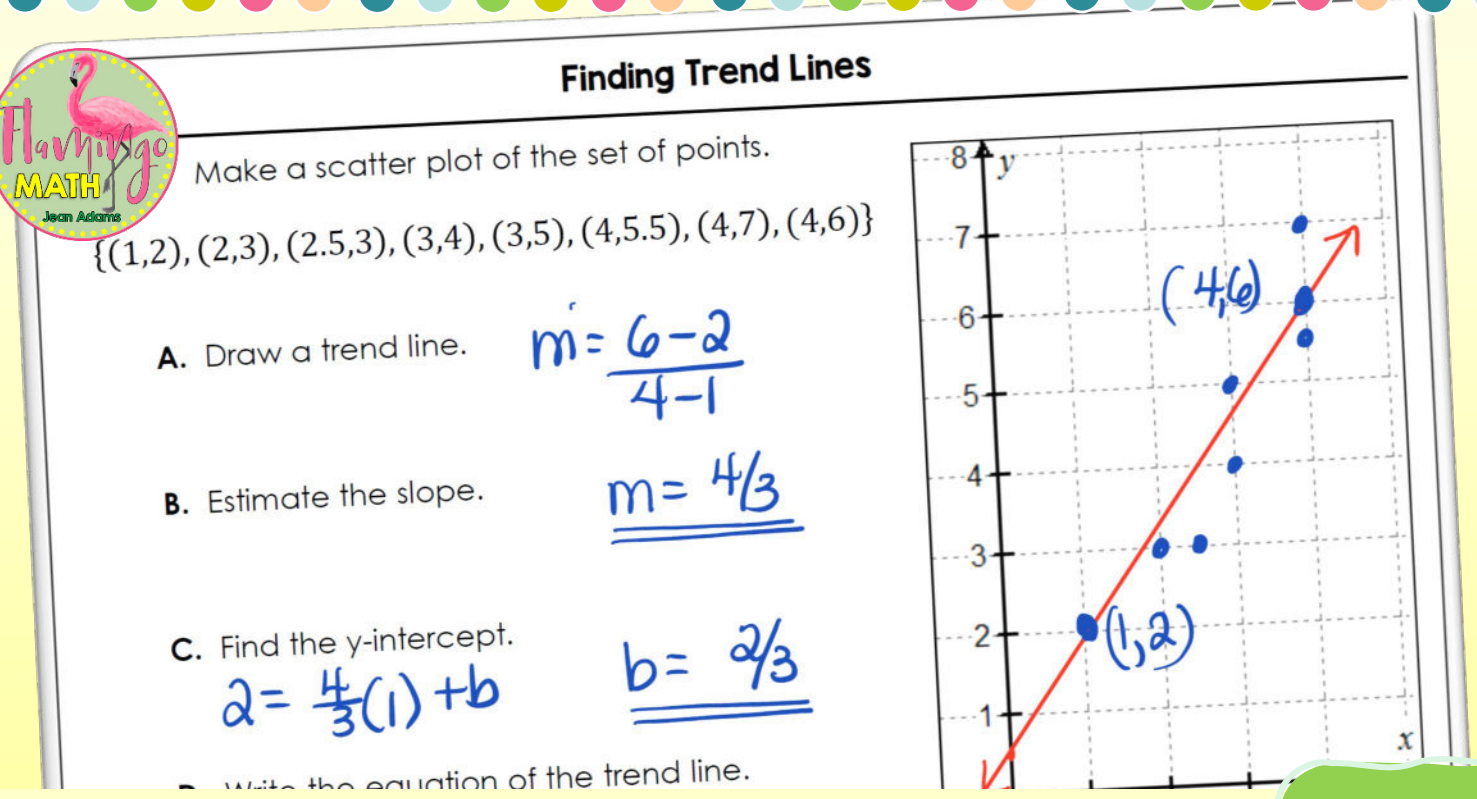
Algebra 2 Honors

Using Linear Models



Completely Editable 2.6

Lesson 6: Using Linear Models

_____ – a graph that relates two sets of data by plotting the data as ordered pairs.

_____ – the strength of the relationship between data sets.

_____ – a line that approximates the relationship between the variables, or data sets, of a scatter plot. Use trend lines to make predictions from the data.

_____ – the trend line that gives the most accurate model of related data.

_____ – indicates the strength of the correlation. Represented by the variable *r*, the closer *r* is to 1 or −1, the more closely the data resembles a line and the more accurate your model is likely to be.

Visual Correlation

EX #2: Is there a relationship between fat grams and the total calories in fast food sandwiches? Use the data in the table below to investigate.

Fast Food Hamburger vs. Chicken		
Sandwich	Total Fat grams	Total Calories
Quarter Pounder	19	410
Big Mac	29	540
McDonald's Double Cheeseburger	23	440
Whopper	39	670
Whopper w/Cheese	47	760
Double Whopper	57	900
Wendy's Single Hamburger	20	430
Wendy's Double w/Cheese	40	700
Wendy's Baconator	51	830
McDonald's McChicken	16	360
McDonald's Grilled Chicken	10	420
McDonald's Crispy Chicken	17	500
Burger King Original	40	660
Wendy's Spicy Chicken	16	440

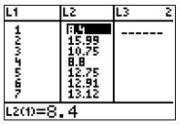
Source: A CalorieCounter.com

1. Set viewing window [5, 60, 10] × [300, 950, 100]
2. Find the line of best fit

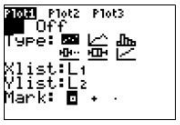
TI-84 Scatter Plot and Line of Best Fit Instructions

CLEAR ALL ENTRIES IN Y= BEFORE YOU BEGIN.

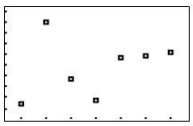
1. ***Make a scatter plot of the data points.***
   Use L1 for the *X*-data and L2 for the *Y*-data. Type values into the lists.
   NOTE: Let 1 = 2006



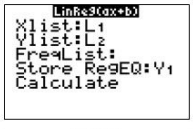
2. ***Activate the scatter plot.***
   Press **2nd STATPLOT** and choose **#1 PLOT 1**. You will see the screen at the right. Be sure the plot is **ON**, the scatter plot icon is highlighted, and that the list of the X data values are next to **Xlist**, and the list of the Y data values are next to **Ylist**.
   Choose any of the three marks.



3. ***View the scatter plot.***
   Press **ZOOM** and **#9 ZoomStat**. Hitting **TRACE** and the right arrow repeatedly, you can advance along the data points.

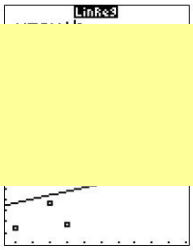


4. ***Calculator determines the line of best fit.***
   Include the parameters L_1, L_2, Y_1.
   (Y_1 comes from **VARS → Y-VARS**, **#Function**, Y_1)



5. ***Calculate the equation***

   Y= _____

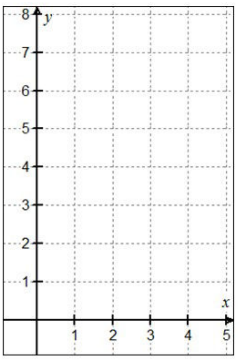


2014?

Finding Trend Lines

EX #1: Make a scatter plot of the set of points.

$\{(1,2),(2,3),(2.5,3),(3,4),(3,5),(4,5.5),(4,7),(4,6)\}$



A. Draw a trend line.

B. Estimate the slope.

C. Find the y-intercept.

D. Write the equation of the trend line.

Creating a Scatter Plot

EX #3: The table shows the number of hours students spent online the day before a test and the scores on the test.

Computer Use and Test Scores	
Number of Hours Online	Test Score
0	100
0	94
1	98
1	88
1.5	92
1.75	89
2	75
2	70
3	78
4	72
4.5	57
5	60

A. Make a scatter plot.

B. How would you describe the correlation?

C. What is the Line of Best Fit?

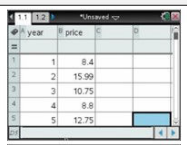
D. ***Correlation does not necessarily mean Causation***

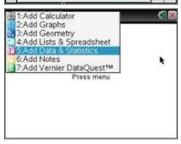
Just because there is a strong correlation between data, does not necessarily mean that one set of data is causing the affect that is occurring in the other set of data. Can you come to a conclusion about this set of data?

TI-NSPIRE Scatter Plot and Line of Best Fit Instructions

CLEAR ALL ENTRIES IN Y= BEFORE YOU BEGIN.

1. ***Make a spreadsheet of the data set.***
   In a NEW DOCUMENT, Add List & Spreadsheet
   CTRL > I > 4
   Use A for the *X*-data (Year) and B for the *Y*-data (Price).
   Type values into the lists.
   NOTE: Let 1 = 2006





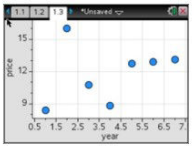
2. ***Create a scatter plot of the data points.***

   Add Data & Statistics
   CTRL > I > 5

3. ***View and align the scatter plot.***
   Mouse over *x-axis* and click year.

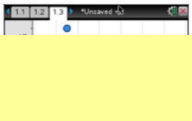


   Mouse over *y-axis* and click price.



4. ***Calculator determines the line of best fit.***
   Menu > 4 (Analyze) > 6 (Regression) > 1 (y=mx+b)

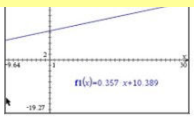




   CTRL > I > 2 **Y=** _____

What is the expected price per box for 2013?

2014?



NOTES

Name _____ Date_____

2.6

Using Linear Models Practice

Problems 1 – 2, write an equation to model each scenario.

1. Andy planted an oak tree measuring 9 feet tall. The tree has grown on average 2 feet each year. Write an equation to model the tree's height h after x years.

2. Emily bought a new car and paid $34,525. She found that the car will depreciate, on average, by $2800 per year. Write an equation to model the car's value V after x years.

Problems 3 – 5, find a linear model and use it to make a prediction.

3. A 2-mile taxi ride costs $6.25. A 5-mile ride costs $12.75. How much would an 8-mile ride cost?

4. The value of a copy machine is $8500 when it is purchased. After two years its value is $7475. What is its value after 8 years?

5. Life expectancy in the United States was 76.64 years in 2000. In 2010, the life expectancy rose to 78.54. Find a function to model life expectancy E in relation to years t. Predict the life expectancy for someone born in the U.S. in the year 2020.

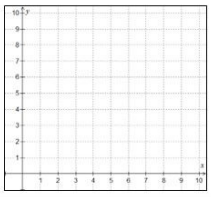
Problems 6 - 7, a linear model for each situation passes through the origin. Find the missing value to the nearest tenth.

6. $17.25 to buy 7 pounds of Georgia peaches, $23.75 to buy ____ pounds.

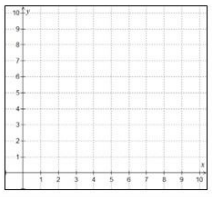
7. 9.5 gallons of gas to drive 230.9 miles, 5 gallons of gas to drive _____ miles

Problems 8 – 9, make a scatter plot of the data. Write the equation of a trend line by estimating the slope and y-intercept.

8. $\{(1.2,2.4),(3,4.1),(4.5,6),(5.8,7.3),(7.3,9.7)\}$



9. $\{(0.7,9.5),(1.6,8.3),(3,7.2),(4.8,5.4),(7,2.6)\}$



Problems 10 – 11, use a graphing calculator to find a linear regression model to predict.

10. The table below shows the amount of money, in billions of dollars, spent on public education from 2010 to 2014.

A. Find a regression equation.

B. Use the equation to estimate projected spending for 2016.

US Education Spending	
Year	$ in billions

11. The table below gives the number of licensed drivers in the US and the population in the U.S. from 2010 to 2013. Find regression equations for

A. year vs. US Population.

B. year vs. licensed drivers.

C. Use the equations to predict the amounts for 2016.

US Population & US Licensed Drivers		
		Drivers

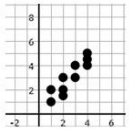
Practice Sets

Lesson Warm-Ups

Name _____ Date _____ Period _____

Lesson 2.6: Using Linear Models **Warm-Up #1**

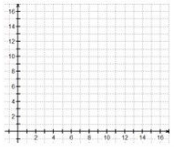
1. What type of correlation does the following graph have?



2. Give an example of a situation that would result in a negative correlation.

3. Make a scatter plot of the following data.

x	1	2	4	4	5	6	7	10
y	16	14	11	10	5	2	3	2

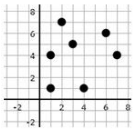


4. Using the information from #3, write an equation of the trend line.

Name _____ Date _____ Period _____

Lesson 2.6: Using Linear Models **Warm-Up #2**

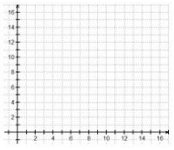
1. What type of correlation does the following graph have?



2. Give an example of a situation that would result in a positive correlation.

3. Make a scatter plot of the following data.

x	0	2	4	5	6	8
y	2	2	5	4	8	9



4. Using the information from #3, write an equation of the trend line and find the expected value of y when x is 12.

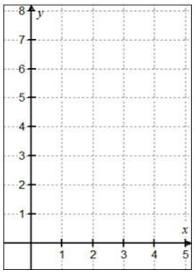
2.6 Using Linear Models **Form A**

Name _____

Date _____ Period _____

1. A car merges onto the interstate 8 miles south of a city. The car travels due south at an average speed of 64.2 mi/hr. Write an equation to model the car's distance d from the city after traveling for h hours.

2. Make a scatter plot of the set of points.
{(1.3,4), (2.5,4), (2.5, 5.5), (3, 6), (4, 6.5), (5,7)}



3. Write the equation of a trend line by estimating the slope and y-intercept.

Grade:

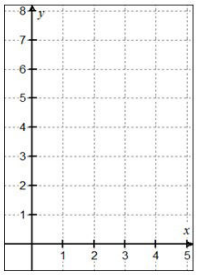
2.6 Using Linear Models **Form B**

Name _____

Date _____ Period _____

1. A water treatment plant removes 1800 gallons of wastewater from a retention pool at a constant rate of 74 gal/min. Write an equation to model the amount of water A in the pool after t minutes.

2. Make a scatter plot of the set of points.
{(0.5,7), (1.5, 6.2), (2.5, 5.5), (3, 4), (4, 3.5), (5,2.5)}



3. Write the equation of a trend line by estimating the slope and y-intercept.

Grade:

Daily Lesson Quiz